CONTENTS

1. SCOPE

1.1 Scope. This document establishes the general manufacturing and testing requirements for discrete semiconductors. Detail requirements, specific device characteristics, and other provisions which are sensitive to the particular use intended shall be specified in the applicable detail specification. This document is intended to provide a level of quality and reliability suitable for the acquisition of non-QPL semiconductors for JPL Mission Class A and B applications; it is not intended for qualification of parts or for certification as defined by MIL-S-19500, or for listing on an approved parts list.

1.2 Type designation. Delete and substitute as follows: "The type designation shall be the part number assigned by the JPL detail specification. The basic structure shall be as follows:

33333-X33333YR

where:

33333	identifies the detail specification
X	identifies the JPL descriptor code for the device family (D=diodes, Q=transistors, B=opto devices)
33333	consists of 5 digits of the generic part number
Y	identifies the general package style
R	identifies the level of TID testing which the lot passed (identified in Table 1b)

Delete Table 1b and substitute as follows:

Table 1b. Radiation Harness Assurance Levels
(Applies to total dose only)

M = 3 krads
D = 10 krads
N = 15 krads*
S = 20 krads*
P = 50 krads*
Q = 75 krads*
R = 100 krads
T = 150 krads*
W = 200 krads*
H = 1,000 krads
X, Y = unassigned: refer to detail specification

(Note: asterisk indicates irradiation levels not standard to MIL-S-19500.)

2. APPLICABLE DOCUMENTS

2.1 Government documents. The JANS requirements of the following documents, of the issue indicated, form a part of this specification unless exceptions are noted herein, in the detail specification, or in the procurement document. (The intent is that MIL-S-19500 and MIL-STD-750 shall form the baseline; this document lists exceptions to them.) The contractor may contact the JPL contract negotiator to obtain copies of these documents.

SPECIFICATIONS

Military

MIL-S-19500H Semiconductor Devices, General Specification for

STANDARDS

Military

MIL-STD-750C Test Methods for Semiconductor Devices, including Notices 1 and 2, except substitute for Method 1019 the text of "MIL-STD-883, Proposed Method 1019.4" dated 1/28/91.

Add paragraph 2.4 as follows:

2.4 Exceptions. References to the U.S. Government and its agencies shall be taken to refer to JPL (e.g., JPL QA source inspection shall be substituted for GSI). References to "JAN", "QPL", and "qualified" do not apply. The detail specification shall be the JPL detail specification.

3. REQUIREMENTS

Requirements of Paragraph 3 apply with the exception of the following:

3.1 General.

3.1.1 Conflicting requirements. Delete items a. through c. and substitute as follows:

a. Procurement document (contract or purchase order)

b. Applicable device specification (associated detail specification or drawing)

c. This specification

d. Specification and Standard referenced in 2.1

Add paragraph 3.1.2 as follows:

3.1.2 Terms, definitions, and symbols. The following terms and definitions shall apply:

3.1.2.1 Delta limit. The maximum change in a specified parameter reading which will permit a device to be accepted on the specified test, based on a comparison of a post burn-in measurement with that recorded prior to the same burn-in.

3.1.2.2 Acquiring activity. The acquiring activity shall be JPL or its subcontractor; the representative usually will be the JPL contract technical manager or contract negotiator.

3.1.2.3 Qualifying activity. The qualifying activity shall be the organization within JPL or its subcontractor that grants approval for acquisition of a particular product from a given manufacturer.

3.1.2.4 Control unit. A control unit is a part of the same device type, package, and manufacturer (but not necessarily of the same lot) as the test specimens, but which is not subjected to any of the stresses that are applied to the test specimens. It is used to verify the repeatability of measurements.

3.1.2.5 Trace number. The trace number is the number assigned by the procurement document to link a part number to a specific purchase order or order release.

3.1.2.6 Contract technical manager. The contract technical manager shall be the principal technical interface between the manufacturer and JPL.

3.1.2.7 Certification. Certification shall mean approval by JPL of a manufacturer for acquisition of a family of devices. Government certification as intended in MIL-S-19500 is not implied.

3.3 Qualification.

3.3.1 Certification of conformance and acquisition traceability. Modify as follows:

a. (3) Product assurance level need not be recorded.

3.4 Product assurance requirements. Add the following: "Devices which have not been tested for ESDS classification shall be considered to be Class 1. Screened parts shall not be shipped in advance of completion of QCI unless the JPL contract technical manager has given technical direction to do so or unless prior shipment is required herein (e.g., DPA samples and catastrophic failures)."

3.4.2 Product assurance program.

3.4.2.2 Manufacturer certification requirements for all product assurance levels. Delete and substitute as follows: "JPL QA representatives may perform a survey to ascertain general compliance with the requirements of Appendix D."

3.4.4 Government source inspection. Substitute as follows: "JPL source inspection and acceptance in accordance with paragraph 4.1.1.1 herein is required on all semiconductors delivered to this specification."

3.7 Marking. Delete requirement to mark with manufacturer's designating symbol (item j). Add the following to subparagraph b., Type designation: "If the size of the device does not permit marking with the entire JPL part number, the letter and first 4 digits immediately following the dash shall be used for marking."

3.7.2 Marking on initial container (unit package). Add the requirement for marking the tube or container with the JPL trace number.

3.7.3 Special marking.

3.7.3.1 Electrostatic discharge (ESD) sensitivity identifier. Add the following: "When a device's ESD sensitivity class has not been determined by test, it shall be marked and handled as Class 1."

Add paragraph 3.7.3.3 as follows:

3.7.3.3 Life test part identifier. Devices which successfully pass life test and subsequent seal tests shall have the letter "Q" added as a suffix to the lot number marking.

Add paragraphs 3.11 through 3.14 as follows:

3.11 JPL review of manufacturer's documentation. The manufacturer shall make available the following items for review and acceptance by the JPL contract technical manager prior to use with their respective JPL lots:

a. Lot traveler(s) for each part type (covering assembly, screen, and QCI operations). Travelers shall include as a minimum the following:

(1) Part number, date code, and any manufacturer internal lot and part numbers

(2) Name or title of operation and specification number of associated process or test

(3) Date(s) of operation and operator identification

(4) Calibration control number or equipment identification of all major equipment components used for test

(5) Quantity tested and rejected for each operation or test (and actual quantity tested if a sample)

(6) Serial numbers of failed devices

(7) Time in and out of process or test if critical to process or test results (e.g., burn-in window)

(8) Specific major conditions of test that are verifiable by operator, including times, temperatures, etc.

(9) Percent defective calculations

(10) Burn-in and life test board serial number or test circuit identification number and revision

(11) Requirements for variables data

(12) Electrical test program numbers and revisions

b. Electrical test program and data recorded from a device of the specified type taken over the full specified temperature range

c. Bench test procedures, if applicable

d. Radiation test plan, if applicable

3.12 JPL QA survey or audit. JPL QA may perform a survey to ascertain general compliance with the requirements of MIL-S-19500 Appendix D. Information regarding recent DESC audits, if any, shall be provided upon request.

3.13 Problem notification. The contractor shall notify the JPL contract technical manager and the contract negotiator within two working days of the occurrence of any of the following:

a. Any catastrophic failure after initial electrical test

b. Any failures in excess of PDA, including failures which appear to result from equipment failure or operator error

c. Any life test failure

d. Any need for re-marking serial numbers

e. Any case in which the number of wafers accepted in radiation testing is insufficient to yield the quantity of devices required by the procurement document.

3.14 Status reporting. The contractor shall provide the JPL contract technical manager and the contract negotiator every two weeks with an oral or written status report stating the current status (point on the lot traveler and quantity of parts in the lot) and expected ship date of each lot in process, and noting any significant problems.

3.15 DPA samples. The manufacturer shall make available to the the JPL contract technical manager 5 samples (or 3 samples in the case of lots containing 50 parts or fewer) upon completion of final electrical test in screening. The DPA samples may be delta rejects and/or high- and low-temperature parametric rejects. The manufacturer shall continue processing of the lot. There is no lot jeopardy associated with the results of JPL's DPA.

4. QUALITY ASSURANCE PROVISIONS

Requirements of paragraph 4 apply with the exception of the following:

4.1 Responsibility for inspection.

4.1.1 Government source inspection. Substitute for the first two sentences: "JPL source inspection shall be required on all semiconductor devices acquired to the requirements of this specification. JPL QA may perform a survey to ascertain general compliance with the requirements of Appendix D."

4.1.1.1 Government source inspection for JANS. Delete the paragraph and substitute as follows: "JPL QA will perform 100% internal visual inspection at precap, and 100% visual inspection and audit of documentation at pre-ship. (The latter may be waived by technical direction from the JPL contract technical manager if QA personnel are not available.) The contractor shall notify JPL QA at least two working days in advance of the scheduled inspection time. Adequate inspection stations shall be provided for the JPL QA representative. JPL QA representatives shall have the option of performing surveillance at any of the points listed as items a through k of paragraph 4.1.1.1."

4.3 Classification.

4.3.1 Formation of inspection lots.

4.3.1.5 Electrical test equipment verification. Add the following: "Three (3) control units shall be measured and recorded immediately before and after each set of electrical measurements of the test specimens. (It is preferred that the same control units be used for all JPL lots of the same device type.) Each set of control unit measurements shall be checked for consistency with the last prior set of control unit measurements before proceeding with testing of the lot. In the event of significant discrepancy between two sets of readings, corrective action (maintenance or re-calibration of the test equipment) and retest of control units shall be accomplished before proceeding with testing of the lot. Note that these control units shall be used for measurements during QCI tests as well as during screening."

4.3.3 Disposal of samples. Delete and substitute as follows: "Samples used for QCI life test shall be shipped to JPL. The manufacturer shall retain with the lot data any other samples used in QCI and radiation test for JPL lots."

4.4 Conditions and methods of test.

4.4.2 Procedure in case of test equipment failure or operator error. Substitute the JPL contract technical manager for Government quality assurance representative and note that JPL retains the option of performing any failure analysis: the manufacturer shall not do any analysis destructive of the part without prior technical direction from the JPL contract technical manager."

Add paragraph 4.4.4 as follows:

4.4.4 Test method deviation. Deviations from JPL-approved test methods must be approved by technical direction from the JPL contract technical manager before testing is begun.

4.5 Qualification inspection. Delete.

4.6 Screening. Add the following: "Screening rejects (including PIND rejects) which are not catastrophic electrical rejects shall be collected, identified as to which test was failed, and retained at the manufacturer's facility with the master set of lot data. The manufacturer will not, however, be required to submit these rejects to be counted by JPL QA inspectors."

4.6.4 JANS product.

4.6.4.1 Burn-in acceptance criteria. Add the following: "Resolution of electrical test data shall be equal to or better than 10% of the delta limit on that parameter."

4.6.5 Failure analysis for JANS. Add the following: "JPL retains the option to perform failure analysis of catastrophic failures. The contractor shall notify the JPL contract technical manager and the contract negotiator within two working days of the occurrence of such failure."

4.7 Quality conformance inspection. Add the following: "QCI test data, completed traveler, and sample devices used for life test shall be shipped to JPL. Any other QCI samples shall be retained by the manufacturer."

4.7.3 Nonconformance. Add: "The JPL contract technical manager and contract negotiator shall be notified within two working days of any lot failure."

4.7.5 Group B inspection. Modify as follows:

a. Delete the intermittent operation life test of subgroup 4 and substitute a life test for 1,000 hours using the same burn-in conditions as those required by the JPL detail specification for the power burn-in (item 12 of Table II) during screening and the end-point electrical measurements of Subgroups 2 and 3 of Group A.

b. Add the following: "Life test parts shall be tested for fine and gross leak in accordance with MIL-STD-750, Method 1071, after completion of the post-life test electrical measurements. There is no lot jeopardy associated with this hermeticity test.

4.7.6 Group C inspection. Not required unless specified.

4.7.7 Group D inspection. Add the following: "Radiation testing is not required unless specified. If it is required, it shall be performed as soon as practicable after wafer fab. The manufacturer shall perform the tests unless the detail specification or procurement document requires that JPL do so. The test method for total ionizing dose (TID) (Subgroup 2) shall be the 1/28/91 draft of MIL-STD-883 Method 1019.4. The type of test (which

subgroup(s) of Group D, radiation levels, bias circuit, and applicable electrical parametric limits will be defined by the detail specification."

Add paragraphs 4.7.7.1 and 4.7.7.2 as follows:

4.7.7.1 Procedure when manufacturer performs radiation testing. The manufacturer shall make available to the JPL contract technical manager for review and approval a proposed radiation test plan prepared in accordance with Method 1019.4. The manufacturer shall assemble test devices from each wafer and test in accordance with the appropriate Group D Method (substituting the 1/28/91 draft of Method 1019.4) and as specified in the detail specification and/or procurement document (if applicable). Electrical measurements shall be made at the specified points.

4.7.7.1.1 Procedure for JFETs. Time Dependent Effects (TDE) testing, in accordance with paragraph 3.10 of Method 1019.4, may be required for JFETs. Test samples for TDE which have not been burned in shall receive 48 hours of pre-irradiation burn-in (using circuit specified in the detail specification). In addition, the post-irradiation measurement requirements of Method 1019.4, paragraph 3.9, shall be revised such that the measurements must be completed within 1 hour of the end of each irradiation.

4.7.7.2 Procedure when JPL performs radiation testing. The manufacturer shall assemble test devices from each wafer, perform room temperature electrical test (preceded by a 48-hour burn-in if TDE testing is planned), and deliver the test devices to JPL to the attention of the contract technical manager. The latter will advise of the acceptability of each of the wafers upon completion of testing.

4.9 Data recording. Delete the final sentence and substitute as follows:

"The following data shall be included with each shipment of screened parts:

a. a copy of the completed lot traveler(s) used for screening and QCI

b. a copy of attributes test data, including the wafer lot acceptance test report (with SEM photos if applicable) and radiation test report if applicable, and X-ray report and films

c. electrical test data for all specified tests, including control unit data

d. summary of parts fallout

e. data for any other special tests required by the detail specification or procurement document

f. copies of any failure analyses, DPA, or engineering evaluations performed by the manufacturer

g. copies of any waivers or Technical Direction Memoranda (TDMs) altering the specified requirements

If tests are labeled with test numbers, a cross-reference shall be provided to relate test numbers to descriptive test name (e.g, IIL, VOH) and pin number. It is preferred that printed electrical test data be formatted such that all measurements of a given parameter are displayed in a column, in serial number order. Electrical test data also shall be provided in a magnetic medium: either IBM DOS-compatible 5-1/4" or 3-1/2" diskette with data in ASCII format or 9-track tape (800 or 1600 bpi) with data in ASCII or EBCDIC format. (If the requirement for magnetic data is waived, two copies of printed data shall be provided.)"

4.9.1 JANS electrical test data retention.

4.9.1.1 Summary of parts fallout. Modify as follows: The summary of parts fallout for JPL lots shall be included with the data shipped with that lot.

5. PACKAGING

Requirements of paragraph 5 apply with the following exceptions:

5.1 Packaging Requirements. Add the following: "All devices shall be handled as Class 1 for purposes of ESD protection unless specified otherwise." Add paragraph 5.1.3 as follows:

5.1.3 Packing slip and invoice. The packing slip and invoice shall include the JPL trace number associated with each line item.

6. NOTES

Delete paragraph 6 entirely and substitute as follows:

6.1 Ordering data. Acquisition documents will specify the following:

a. Type designation/part number

b. Number of associated detail specification

c. Any difference in test data requirements from those listed in 4.9 herein

d. Requirements for special carriers, lead lengths or finish, or lead forming, if applicable.

e. Name and telephone number of JPL contract negotiator

f. Name and telephone number of JPL contract technical manager

g. Name and telephone number of JPL QA coordinator of source inspections

h. JPL trace number

i. Any special requirements which differ from those indicated herein or in the detail specification (e.g., those involving source inspections, traceability, radiation test, etc.).

6.2 Intended use. Semiconductor devices conforming to this specification are intended for use when JANS qualified parts of adequate radiation hardness are not available. When a device has been qualified for JANS listing at an acceptable radiation hardness level in QPL 19500, this specification shall not be used for new design: the QPL 19500 JANS product shall be preferred for all applications.

Filename: CS515581.C
Directory: H:\USERS\514\SPECS\ACT-GENL
Template: F:\USERS\JSANSONE\MSOFFICE\WINWORD\TEMPLATE\NORMAL.DOT
Title:
Subject:
Author: Jennifer Sansone
Keywords:
Comments:
Creation Date: 08/10/95 1:34 PM
Revision Number: 1
Last Saved On:
Last Saved By:
Total Editing Time: 0 Minutes
Last Printed On: 08/10/95 1:38 PM
As of Last Complete Printing
Number of Pages: 12
Number of Words: 3,740 (approx.)
Number of Characters: 21,318 (approx.)